

# A Global Space Control Strategy

Dr. B. T. Cesul

The 2011 *National Security Space Strategy* notes that space is becoming an operating medium in which the continued dominance of the United States is not assured.<sup>1</sup> Already, potential adversaries have overtly demonstrated advancement in the development of space control systems that directly threaten the US use of space today—China's 2007 destruction of a domestic satellite with a direct-ascent antisatellite (ASAT) system is the highest exemplar.<sup>2</sup> Additionally, other nations such as Russia have surpassed the post-Cold War taboos of talking about the development of space control activity with the announcement of the fielding of the Sokol-Eshelon airborne laser ASAT system and continued references to new space control weapons under development to challenge the United States.<sup>3</sup> Consider also the lowered barrier of entry for space systems development because of small satellite and microelectronic technology advances and the perceived lack of tangible, international sanctions and punishment as a result of acknowledged ASAT testing. These factors have muddied the international-policy picture. Emboldened actors appear ready to push the envelope as to what the United States and international community will accept in ASAT testing and development before significant pushback is enacted. Further, a growing body of literature suggests that space-based intelligence, surveillance, and reconnaissance (ISR); communication; and precision navigation and timing assets are in various stages of development in potential adversary nations to support the employment and improvement of terrestrial weapons.<sup>4</sup>

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<b>Report Documentation Page</b>			<i>Form Approved OMB No. 0704-0188</i>	
<p>Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p>				
1. REPORT DATE <b>DEC 2014</b>	2. REPORT TYPE	3. DATES COVERED <b>00-00-2014 to 00-00-2014</b>		
4. TITLE AND SUBTITLE <b>A Global Space Control Strategy</b>		5a. CONTRACT NUMBER		
		5b. GRANT NUMBER		
		5c. PROGRAM ELEMENT NUMBER		
6. AUTHOR(S)		5d. PROJECT NUMBER		
		5e. TASK NUMBER		
		5f. WORK UNIT NUMBER		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Air Force Research Institute (AFRI),Air and Space Power Journal,155 N. Twining Street,Maxwell AFB,AL,36112</b>		8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)		
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)		
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>				
13. SUPPLEMENTARY NOTES				
14. ABSTRACT				
15. SUBJECT TERMS				
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Same as Report (SAR)</b>	18. NUMBER OF PAGES <b>16</b>
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>	19a. NAME OF RESPONSIBLE PERSON	

Furthermore, a “space war” has been predicted in blue ribbon commission reports and congressional testimony, and the chances of conflict with an adversary possessing space control capabilities are high in the next 10 years.<sup>5</sup> In fact, open-source reports of events such as the 2003 jamming of a commercial communication satellite by Iran from Cuban locations and multiple satellite-jamming events reported during various Arab Spring events indicate that we have already entered an “Age of Space Warfare.”<sup>6</sup>

Space warfare is a politically fraught concept. It encompasses sensitive government activities and commercial entities seeking a benign environment. It is politically taboo to discuss space control events. Doing so runs the risk of creating panic within the booming commercial satellite industry or, worse, suggesting a space arms race. The US Air Force uses the terminology of “space superiority” in which offensive space control, defensive space control, command and control, and space situational awareness (SSA) form a four-legged-stool construct.<sup>7</sup> Attempts to construct a framework in which to discuss the strategic implications of such have led to analogies based on other war-fighting mediums, such as John Klein’s *Space Warfare* (naval analogy) or David Lupton’s *On Space Warfare* (influenced by airpower theory).<sup>8</sup> These and other works attempt to cast the space warfare issue in light of an overall space security posture. Although these efforts are more appropriate for a national-level vision on the usage of space for power projection, this article attempts to lay a framework and establish basic conceptual tenets necessary for a discussion of the development of a national space control strategy consistent with our desire to remain the world’s dominant space actor.

The intent behind the operations is different, but in reality offensive and defensive space control can be thought of as a single concept—space control—since adversaries will likely not draw those distinctions between offensive and defensive space control if the US action is to induce effects on their space or counterspace capability. Space control, as defined in this article, is the use of weapon systems or operational

concepts to gain military advantage by the denial or defense of space and counterspace assets. Simplistically, space control can be thought of as jammers, lasers, and missiles attacking satellites, but the capability has a depth beyond just “spearheads.” The United States has acknowledged possessing a space control capability—the Counter Communications System, a ground-based option to “deny adversary IADS [integrated air defense system], deny satellite services (fixed, broadcast), and provide electronic support capabilities.”<sup>9</sup> Other historical systems (F-15 ASAT, Brilliant Pebbles, etc.) can be brought up as well to show that space control technologies are not new to the Department of Defense (DOD).<sup>10</sup> However, in the contemporary context with budgetary pressures and a multipolar world threatening the entirety of US space usage, new space control capabilities need to be developed. But without a coherent, unifying space control strategy grounded in an understanding of the required missions and the means to do so, acquisition efforts may become exercises in developing individual capabilities with significant inefficiencies detrimental to operations, infrastructure, and purpose. If implemented, the space control strategy presented below can be used as a guidepost to ensure that new weapon systems are developed in the context of a holistic space control architecture, avoiding the customized acquisition solutions that may provide point solutions to specific threats which may never materialize in an adversary nation.

## The Strategy

The United States, through the DOD and with support from the Office of the Director of National Intelligence, should develop space control capabilities in order to reach two goals:

1. Ensure an initial deterrent posture that discourages adversaries from conducting space control operations and continues US access to space, enabling terrestrial power projection. If deterrence fails, the United States will be able to conduct military operations without the use of individual, distinct space assets.

2. In case of crisis and conflict, exercise across a five-dimensional spectrum (deceive, deny, degrade, disrupt, and destroy) of effects capabilities against an adversary's space and counterspace systems that provide utility to his military capabilities.

To enact this strategy, the United States should pursue space control capabilities to

1. control the electromagnetic (EM) spectrum over and within a locale at a time and severity of our choosing to enable US freedom of action and information dominance;
2. counter, both kinetically and nonkinetically, adversary space and counterspace systems directly threatening US assets in space or terrestrially, with preference to options that minimize disruptions to US and allied space capabilities while defeating the enemy kill chain as early as possible in a crisis situation; and
3. utilize a command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) posture (including the development of SSA architecture) that allows the United States to develop and execute space control plans and operations, specifically provide indications and warning of catastrophic space events, discover indications and warning of impending hostile space control activities, maintain custody of threat systems, and deliver intelligence to support space control options.

## Rationalizing the Strategy

First, acknowledgement that the space environment presents unique challenges that affect strategy must be addressed. Although it is true that space is largely a "transparent" environment (i.e., because of orbital mechanics, satellite overflight will be fundamentally repeatable over a certain ground area), space is not a clear operating environment. Lack of a globally shared tracking and monitoring network at an acceptable persistence tempo, staffed with sensors of a sufficiently

high performance metric, allows for blind spots to develop—even our SSA picture. Because of maneuver operations, intelligence exploitation of shortfalls in geographic sensor placement and performance, and the potential to change the apparent signature through a simple alteration of orientation with respect to sensor-point angles, we can never be certain about what a space object is and what it is doing. Therefore, a strategy must acknowledge that omniscience in SSA is not possible and that a risk-management process must be the foundation of planning space operations and responses.

Second, we must realize that in order to conduct effective space control efforts, the Title 10 and Title 50 communities in the United States have to be unified, at least in purpose if not in (limited instances) structure. The union of capabilities is necessary because (1) the space assets used are both Title 10 *and* Title 50 assets and (2) the Title 50 side has the preponderance of information necessary to enact space control operations. The intelligence community can bring the exquisite intelligence products on capabilities and performance of foreign space/ counterspace systems as well as specific target-development data that the “space war fighter” needs to perform weaponeering against an adversary’s space or counterspace capability. Because of the historical divide in the United States between Title 10 and Title 50 space and counterspace activities, we need a formal recognition of the need (and assignment of duty as provided with this language). Already some efforts have taken place (e.g., creation of the Space Security and Defense Program) inside the US government to establish bridgeheads across the Title 10 / Title 50 divide. Ideally a future Joint Intelligence Operational Center for space would be the focal point for space control support efforts and would have pre-positioned Title 50 intelligence available to support its operational activities. In today’s force structure, this function would be filled by the Joint Space Operations Center under the Joint Functional Combatant Command for Space. However, the proposed strategy does not make that distinction since the Title 10 community’s concept of how to conduct space control operations is still maturing and the proposed strategic construct does not desire to

force upon the Title 10 community a responsibility that it may not be ready to accept. But it does need to be absolutely clear that in matters of the development and operation of space control capabilities, the DOD has the lead with the elements of the Office of the Director of National Intelligence in a support role.

### ***Strategic Goal One: Ready to Fight without Trying to Pick One***

Maintaining a conflict-free environment is always preferred. The desired end state is avoidance and deterrence of conflict that may escalate into terrestrial battle with human casualties. In general the United States should try to maintain stability by using a strong deterrent posture to discourage escalatory activity in space. However, maintaining deterrence is complicated by three factors unique to the space fight: (1) demonstrating and fielding a believable deterrent capability is in itself a destabilizing position in the current geopolitical climate, (2) the physics of space and counterspace operations allow first strikes to occur in a relatively short time frame, reducing the response time for counter-countermeasures, and (3) in any calculus of a “space war,” the potential adversary has a strategic advantage in challenging US space dominance since no other entity integrates and uses space-enabled capabilities into its war-fighting capacity to the extent the United States does. Consequently, the best defense in discouraging an adversary action against US space dominance may be to prove that the United States can fight and win without some space capabilities.

The current political climate, both internationally and domestically, is generally aligned against the “militarization of space.” As enshrined in the 1967 Outer Space Treaty, space is to be treated as a global commons for mankind.<sup>11</sup> Indeed, even during the Cold War when both the United States and USSR flew dozens of national security space assets, these were considered immune from attack in most cases outside the imminent eruption of full-scale nuclear war.<sup>12</sup> Today the overwhelming shadow of US conventional military dominance, now definitively enabled by space utilization, has caused a knee-jerk reaction to try to

limit continued US development of military space capabilities through soft power mechanisms of United Nations treaties and other international agreements in proposal. With regard to space control specifically, multiple instances demonstrate a hypersensitivity to the perception of US space control activity.

This has likely caused an internal “pullback” within US leadership to avoid discussing the aspects of US space control development. Some people would argue that we are really seeing a realization of strategic ambiguity (e.g., the “Israeli nuclear posture”), but it is more a function of a desire to minimize international stressors. Effective development and employment of space control capabilities demand open recognition that the United States is willing to develop and field space control capabilities in an operational context. Adversaries already believe that the United States is a 10-foot-tall giant; however, they also believe that political pressure will voluntarily restrict our usage of overwhelming force and open windows for their victory (and continued aggressions). A clear and unambiguous statement of our capabilities and intention to use them may buy us the strategic pause necessary to try to de-escalate situations from a conflict state.

From the policy maker’s perspective, space control is expensive and provocative, and the desire to enter into another costly military buildup has ebbed. The 2012 fact sheet on the DOD’s space policy mentions resiliency of the architecture as a key acquisition strategy but does not address the active development of space control.<sup>13</sup> One can interpret this omission to mean that the United States cares only about defending current assets and not imposing conditions of our choosing in the space medium. Point number four on the 2011 fact sheet on the DOD’s strategy for deterrence in space states that the United States will “be prepared to respond to an attack on U.S. or allied space systems proportionally, but not necessarily symmetrically and not necessarily in space, using any or all elements of national power.”<sup>14</sup> This assertion reserves the right for space control development; additionally, it might increase the adversary’s apprehension that should

the United States not have adequate space control measures, it could strike terrestrially, possibly increasing the enemy's desire to conduct operations on a larger scale to ensure that the US response is muted by loss of enabling space capability.

### ***Transitioning to Strategic Goal Two: Bringing the Wood***

The language in these two fact sheets reserves rights for response and a commitment to resiliency. However, because of the short time frames involved with many counterspace attacks, "he who shoots first wins the first battle." Direct-ascent attacks from launch to intercept in low Earth orbit are approximately 10 minutes in duration. Directed-energy attacks and radio frequency (RF) jamming attacks, once committed to, are nearly instantaneous in their effect because the attacking medium travels at the speed of light. This highlights the need for preemptive action to protect space assets. It differs from preemptively starting a war, and—in the context of a potential global conflict—striking an adversary before he can shoot is advantageous. A purely defensive posture of countermeasures, protective technology, and rapidly enacted changes in the concept of operations is less provocative but also probably more costly and less likely achievable, considering the nearly omniscient intelligence picture that would have to be developed for every potential adversary and action. Development of a multilayered space control strategy allows preemption to be on the table.

Another problem is that the DOD's use of space capabilities is not only a significant force multiplier but also a substantial vulnerability in the way we conduct modern warfare. No other nation uses space to as great a military utility as the United States. Therefore, any other country benefits in a risk/reward calculus about the trade-offs in conducting space control operations. Consequently, in any conflict, the United States would likely experience (1) attacks on space capabilities (including some that might take out an asset for the duration of the conflict) and (2) use of space assets against us in conducting military opera-

tions. Both of these cases supply the motivation to develop space control capabilities.

Regarding such development, we should give consideration to the fact that we have a range of options available—from reversible-effects capabilities like jammers that can surgically target transponders of interest, to destructive capabilities such as ground- and space-based interceptors that give the commander assurance of mission kill. Obviously the United States enjoys freedom in the terrestrial medium to select a spectrum of weapon effects, controlling collateral damage and limiting destruction to acceptable levels in accordance with the Law of Armed Conflict and rules of engagement in effect. No international or domestic legal restrictions on the conduct of space war exist, with the notable exception of the placement and usage of weapons of mass destruction in orbit, so we should make an effort to embrace the cultural shift of developing and acknowledging space control capabilities. The proposed strategy can be an embarkation point.

Goal two explicitly states that the United States will not fight a purely defensive space control war and will utilize capabilities to inflict a range of effects on the opponent's capabilities. Specifically, it also allows for actions on his space capabilities, providing a realization that foreign space capabilities like imagery satellites or navigation analogues to the Global Positioning System have matured and should be considered viable targets. The adversary hopes to negate US surprise operations or the extension of weapon system capabilities beyond the immediate theatre of conflict; the United States should be prepared to eliminate that advantage.

## The “Three Enactions”: Enabling a Coherent Acquisition and Planning Capability

Every strategy needs ways, means, and ends. The “three enactments” included in the proposed strategy offer the means to attain the two goals mentioned previously. Both provide guidance without being

overly prescriptive of the range of options the United States should pursue in the cultivation of space control capability—linked to a desired end-state effect. These are neither individually new nor groundbreaking concepts, but if they are linked in a strategic context, this proposal would add clarity of thought to one aspect of the space superiority discussion.

### ***Enaction One: Controlling the Electromagnetic Spectrum***

Information dominance is a central tenet of the United States' advantage in warfare. The EM spectrum (for this purpose, the EM spectrum is usable radio frequencies and other frequencies used for transmission of data, such as laser communication) is the means by which we and our adversaries attempt to transmit information and command forces. Control of this spectrum in the battlespace is crucial. At the simplest level, denying communication between the ground operator and satellite (and vice versa) essentially eliminates any capability that the satellite provides to the user community on Earth, thus preventing an adversary's use of his space assets. Opponents with less-developed terrestrial communication infrastructures have in many cases turned to relatively inexpensive and easy ways to initiate satellite communication services to supply wide-area propaganda dissemination as well as, in limited instances, military or national-level command and control. Satellite navigation services are enabled by the use of EM signals transmitted between terrestrial users and space assets. The evolution of small satellite technology and the miniaturization of RF components have made readily available space-based radar ISR assets a reality for potential enemies. All of these factors make it blindingly obvious why the United States would want to control the EM spectrum in conflict. Additionally, since the United States is almost always “playing an away game,” the remote connectivity offered by space services is crucial in maintaining beyond-line-of-sight connectivity—hence the desire not simply to blanket an area with complete EM silence. Instead the United States should attain use of the EM spectrum on our terms,

having control over what the adversary uses the EM spectrum for and when he uses it.

This enaction is listed first since it also provides what is likely the most mature technology, most cost-effective solution (since many of the options here are ground-based solutions), greatest ability to scale-up production, and ability to impose a wider range of effects than those of some other capabilities. Furthermore, EM spectrum effects usually do not cause direct loss of life or property and can be executed so that they are reversible—typical goals when one conducts terrestrial warfare operations. Also, *complete* control of the EM spectrum would essentially deny the adversary command and control of *any* other space or counterspace capability unless it were completely independent of terrestrial command infrastructures.

Even then, complete control of the EM spectrum in the broadest definition could include some options to defeat autonomous systems such as cyber-enabled command intrusion against the adversary's weapon system or RF weapons. The language chosen would allow the consideration of cyber capabilities within the context of this strategy since the EM spectrum is the medium in which cyber actions are conducted.

### ***Enaction Two: Crossing the Threshold into “Space Weapons”***

We have to realize, though, that at some point in a future conflict, as much as we desire to control the EM spectrum, the United States might have an opportunity to take action and defeat an adversary's capability that threatens our use of space. This could come in the form of active defense technologies against an incoming direct-ascent interceptor, the use of directed-energy weapons against an enemy's space-based ISR sensors, or even satellite-on-satellite engagements. The United States must plan for this eventuality and become proficient not only in proposing these types of weapon systems but also in employing them. This is the most controversial piece of the strategy since we would be advocating the development and fielding of capabilities deemed by many policy analysts the most provocative. Much as evolu-

tions in acceptable behavior of warfare allowed for Minutemen firing on Redcoats from protected perches, the United States must not self-constrain the development of space control capabilities or risk falling unacceptably behind technology fronts that our potential adversaries are developing so that we are seen as acting “gentlemanly” in international circles. Winning the fight is paramount.

Acting as early in the Red kill chain as possible maintains the maximum options for courses of action available to a commander and increases the reaction time available to Blue forces. For that reason, we should give preference to those options stated in the proposed strategy. We should consider both kinetic and nonkinetic options since at times the commander may need the assurance of kill presented by a kinetic attack (debris or policy considerations aside). We would also impose costs on Red countermeasure design by forcing the opponent to account for our full continuum of options. Nonkinetic options at times present the advantages of hiding attribution or sowing seeds of doubt as to the cause of system failure, but they should not be considered a silver bullet. Typically, nonkinetic options require a higher level of fidelity of intelligence on the target (increasing the cost and risk of success by placing greater reliance on intelligence information), and the battle damage effects may be more difficult to discern after the engagement. This is especially true in the space medium, where the distance from Earth to space and the nature of orbits present a substantial challenge to maintaining adequate situational awareness. Thus in some sense, compared to nonkinetic options, kinetic options are “cheaper” when we consider the foundational intelligence workload that has to be applied. However, both have their place in the context of bringing a full continuum of capabilities to a commander’s disposal, and both need to be supported within a strategic outlay.

The language in enaction two throws open the aperture to space control developers and planners, allowing them the freedom to consider all potential vectors, regardless of political sensitivity. Again, the objective of this strategy is to supply a context in which space control

capabilities can be developed and employed. If the situation is such that we must consider the employment of space control capabilities, we are likely past the point of trying to manage a crisis and instead should focus on what we need to do to emerge victorious on our conditions in the conflict.

### ***Enaction Three: Someone Has to Control This***

Inherent in the fielding of coherent space control capabilities is the need to provide coherent command and control for them. Enaction three specifically calls for development of a unified C4ISR structure that permits the success of space control operations. This includes in explicit language the development of an SSA architecture to support space control as well. Doing so has the effect of broadening one's understanding of the SSA mission from "traffic cop of space" or "where, who, and what is in space" to an end state where commanders considering multiple courses of action have a sensor architecture *and* a tasking, collection, processing, exploitation, and dissemination concept of operations in place to support target-folder-level decision making. Just as air-to-air superiority doesn't involve only the F-22 airframe, neither does space control involve only the weapon system. A supporting infrastructure needs to be in place and exercised to go all the way from indications and warning of a space or counterspace event counter to our interests through the execution and analysis of the space control option we conducted. This enaction makes it clear that these issues must be addressed at the same level of importance as the engineering and development of the actual weapon system. A deterrent posture is most effective when you demonstrate that you can operate the weapon system.

## **Conclusion**

The strategy proposal laid out here provides a concise statement of US goals and means to produce an end state in which the United States

is prepared and willing to engage in space control activities in support of our national interests. It obliterates the line between defensive and offensive space control for the most part since in the greater context, our potential adversaries will rarely make that distinction. Moreover, it removes the strategy of space control from the greater umbrella of space superiority to reduce ambiguity in this crucial area. In clear terms, the strategy allows for the investigation and fielding of a full continuum of space control options by the United States. It declares that we prefer a stable order whereby deterrence rules the day and keeps space a global commons. However, it also clearly indicates that the United States will not settle for a situation in which we are only defending against a siege of our space capabilities and will not be held captive by unspoken international taboos. Although the individual concepts in this strategy are not new and many have been presented in other forums, this article offers this strategy for consideration as an original, organic, and coherent statement of guidance and direction as we traverse the Age of Space Warfare. ♦

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## Notes

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